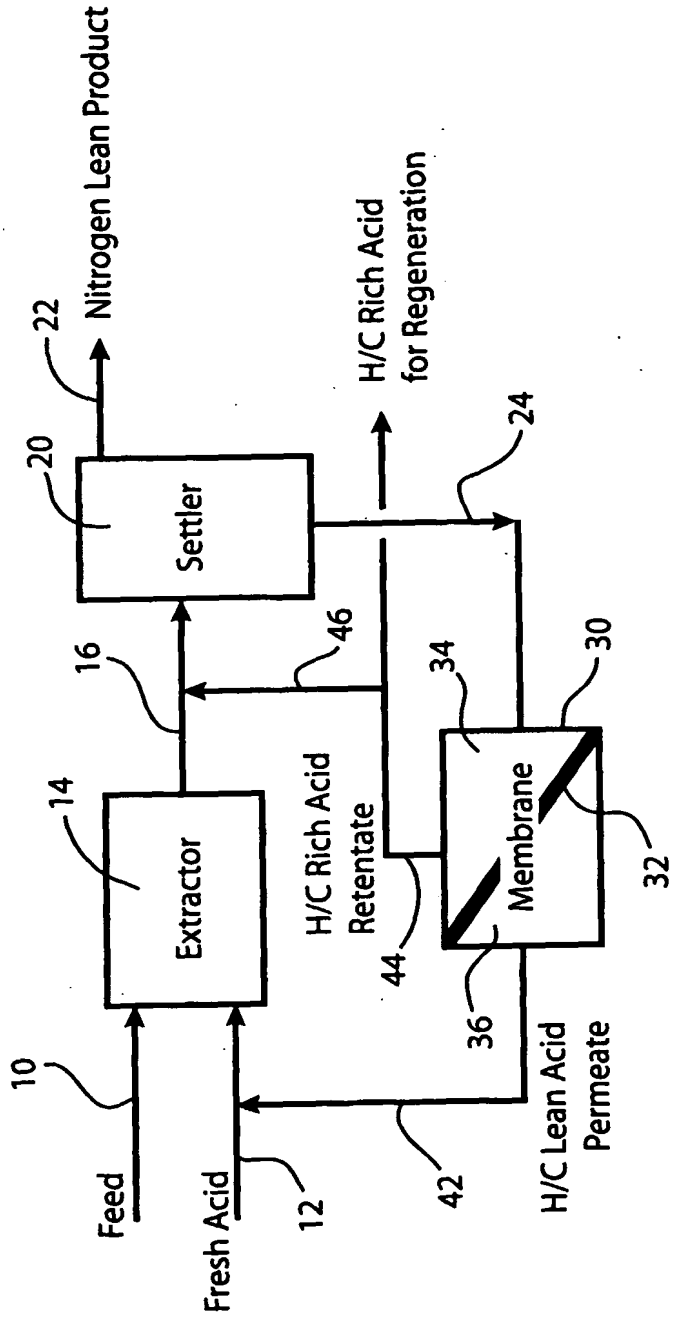
Nitrogen Lean Product
22
H/C Rich Acid
for Regeneration
24
20
Settler
46
16
34
30
14
Extractor
H/C Rich Acid
Retentate
Membrane
32
44
36
10
Feed
Fresh Acid
12
42
H/C Lean Acid
Permeate

FIGURE 1

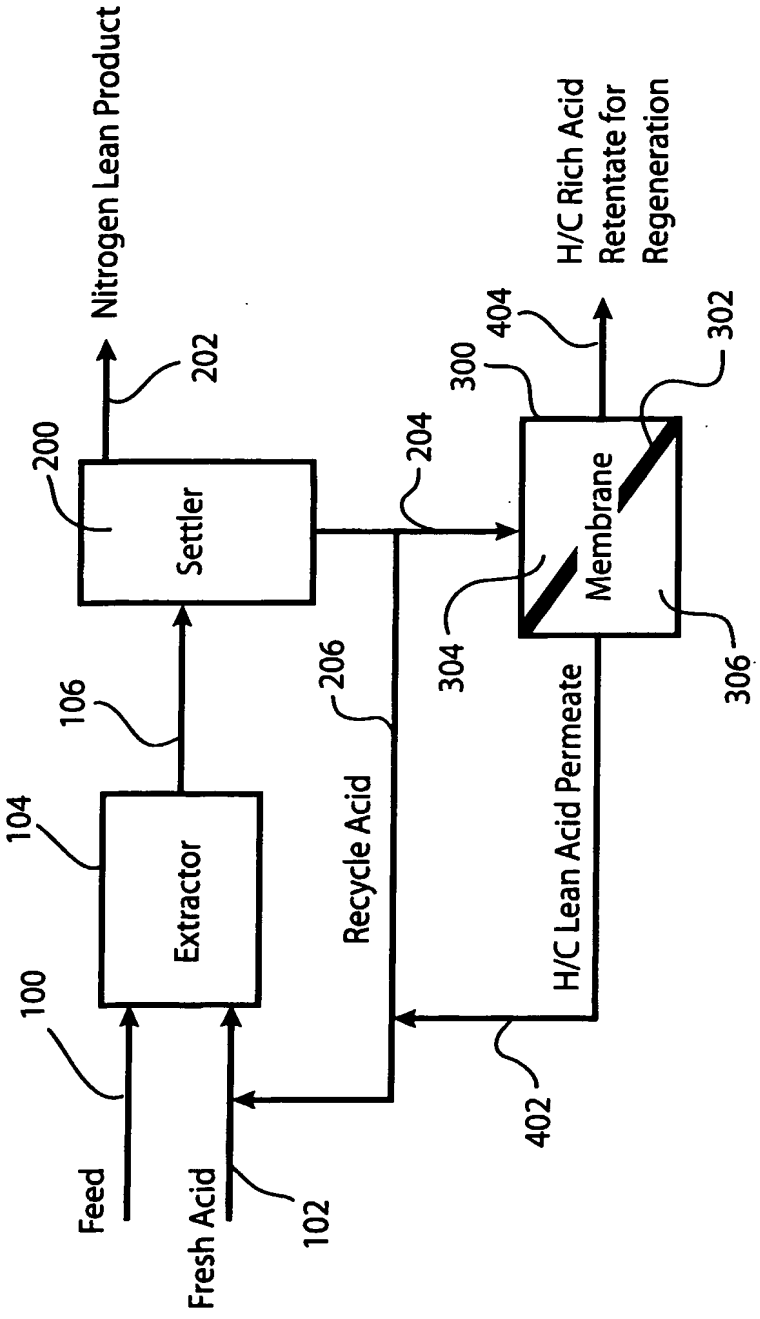
Nitrogen Lean Product
202
200
Settler
204
300
404
H/C Rich Acid
Retentate for
Regeneration
302
Membrane
304
306
206
Recycle Acid
106
104
Extractor
100
Feed
Fresh Acid
102
H/C Lean Acid Permeate
402

FIGURE 2

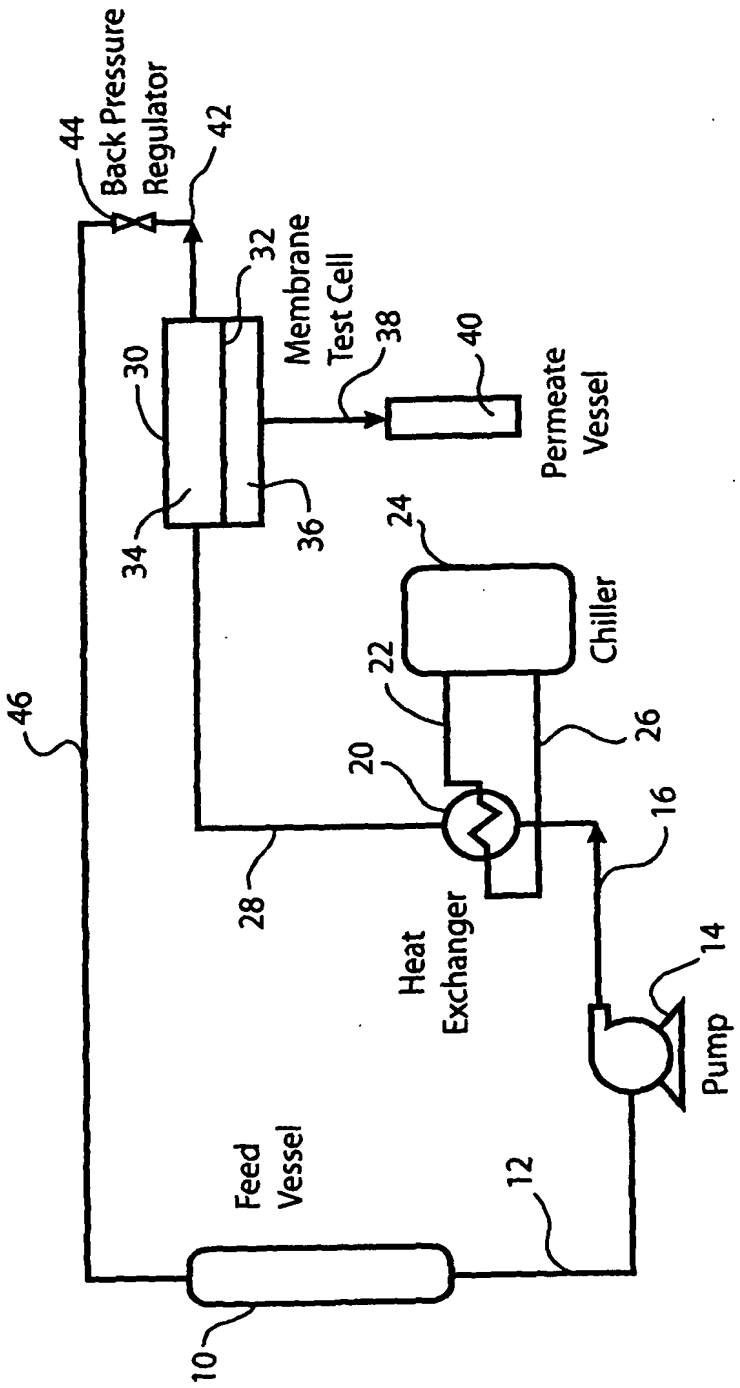
Back Pressure Regulator
44
42
32
Membrane Test Cell
38
40
Permeate Vessel
30
34
36
24
Chiller
22
26
46
20
16
28
Heat Exchanger
14
Pump
Feed Vessel
12
10

FIGURE 3

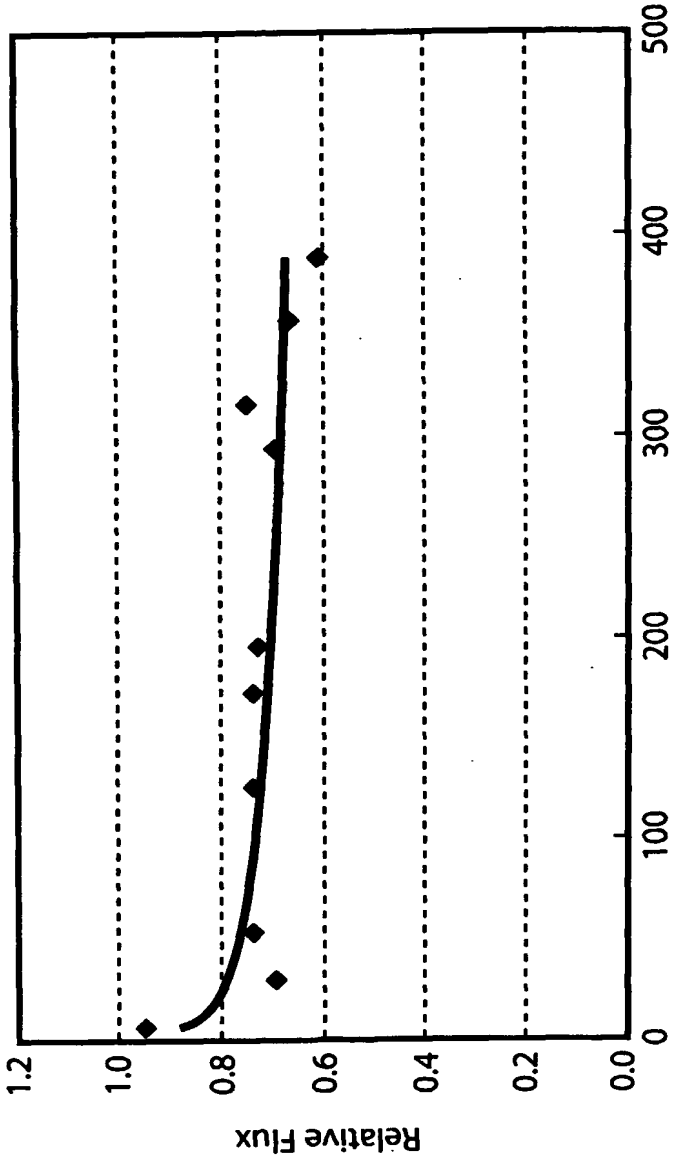
Relative Flux
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
100
200
300
400
500
Run Time, Hours

FIGURE 4

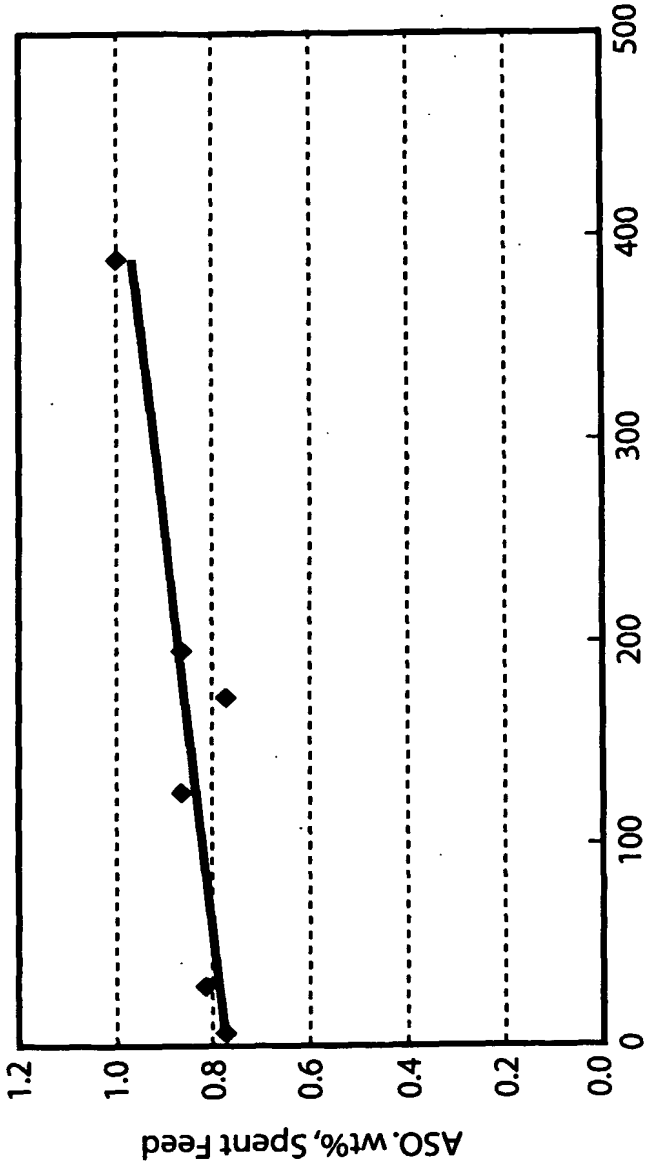
ASO, wt%, Spent Feed
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
100
200
300
400
500
Run Time, Hours

FIGURE 5

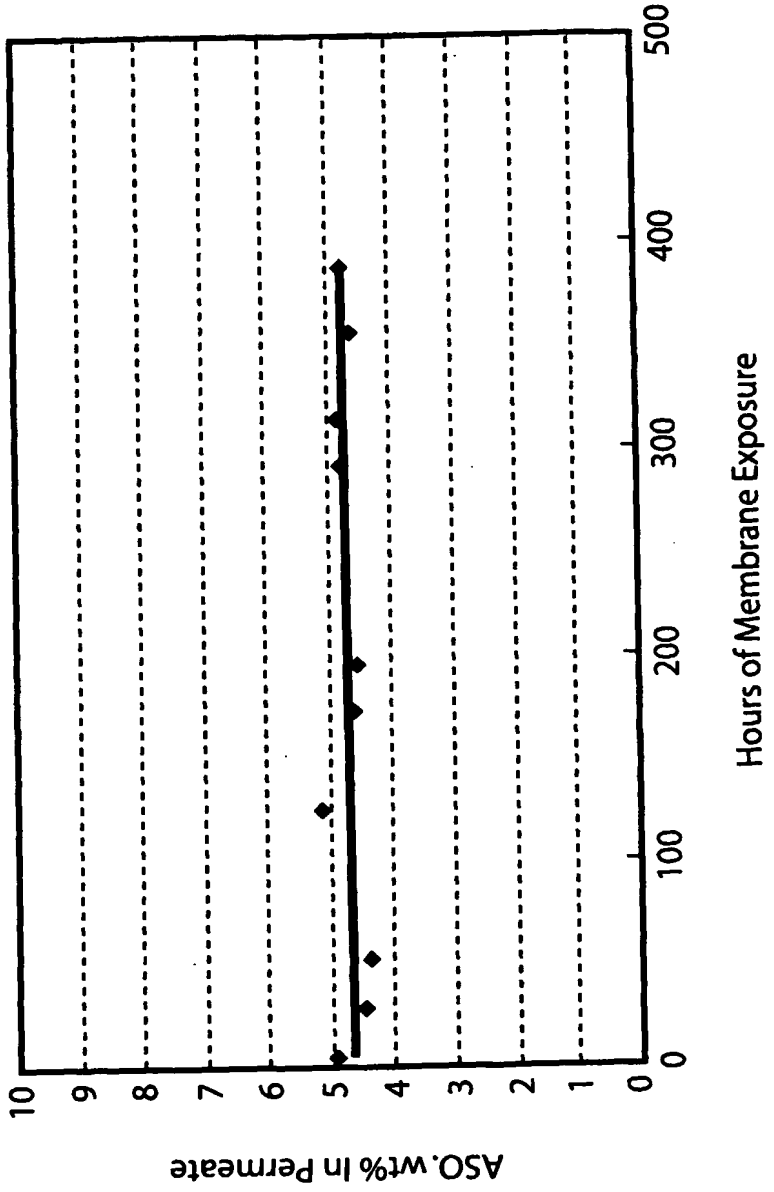
ASO, wt% In Permeate
0
1
2
3
4
5
6
7
8
9
10
0
100
200
300
400
500
Hours of Membrane Exposure

FIGURE 6